

Load-Bearing Inflatables Using Light-Curing Rigidization Technology, Phase I

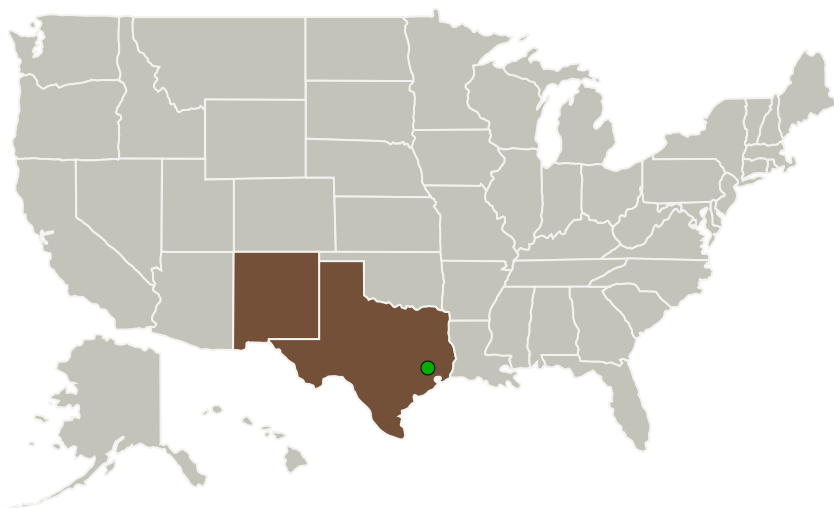
Completed Technology Project (2012 - 2012)



Project Introduction

NASA is soliciting new concepts for lightweight stabilized inflatables in regards to low weight, high storage density, and ease of deployment. What most of the inflatable concepts are lacking is the ability for integrated structural members that do not require permanent inflation pressure. Any structure requiring inflation pressure for structural stability becomes hazardous in case of puncture due to micrometeorite impact or crew activity; it's hard enough to fix the puncture without the whole structure collapsing around the operator like a tent. Additionally the structural supports should allow for the integration of hard points or other modular functionalities. Adherent Technologies, Inc. has been actively developing stabilization concepts for space inflatables for years. Applications ranged from inflatable shelters, with or without self-healing capabilities, antenna structures, inflatable wing concepts, and structural repair tape. The technology is known as Rigidization on Command™ (ROC), and is accepted as the best solution to preserve inflatable structures in the absence of inflation pressure. The materials have been shown to store in minimal volume using both z-fold and rolling approaches, without damage to the core fiber structures. ATI is now proposing to extend the approach to structural elements to add strength to these structures, and provide building blocks for structurally challenging substructures like floors or roof supports for regolith-covered radiation resistant shelters. Resin impregnated fiberglass, carbon fiber and other advanced reinforcing materials will be used to obtain optimal mechanical properties at minimum weight. As a proof of concept, the Phase I program will concentrate on the basic unit of most modular structural construction, the I-beam. Goal of the program is a 3m demonstration beam.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Adherent Technologies, Inc.	Lead Organization	Industry	Albuquerque, New Mexico
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New Mexico	Texas

Project Transitions

▶ **February 2012:** Project Start

✓ **August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138257>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Adherent Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jan-michael Gosau

Co-Investigator:

Jan-michael Gosau

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.1 Lightweight Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System